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Sage Grouse Status and Recovery Plan for Strawberry Valley, Utah

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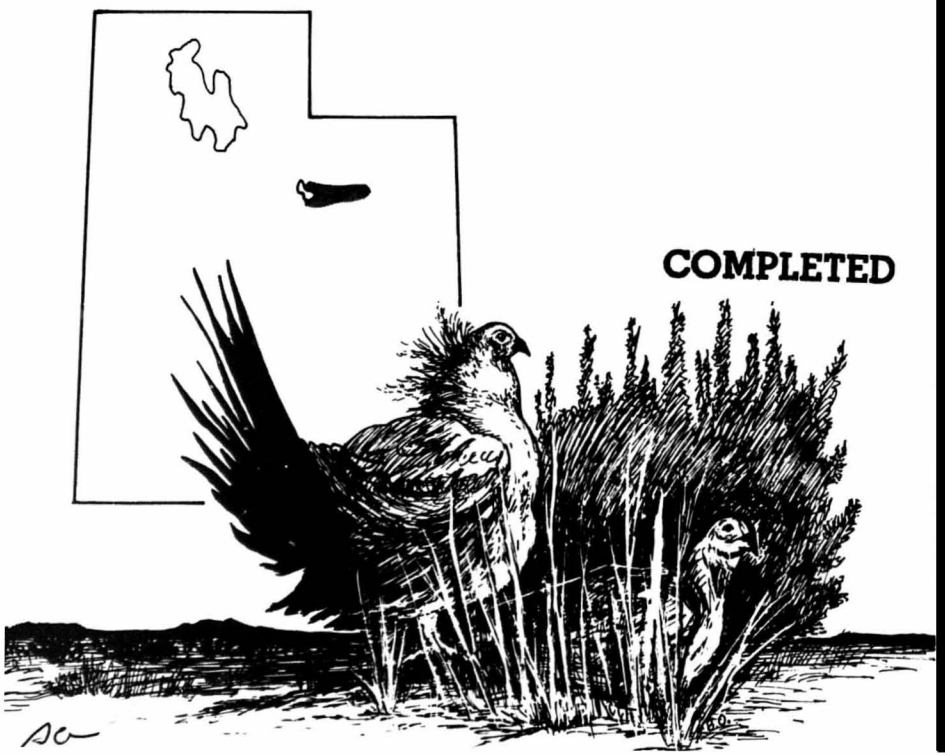

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RESEARCH SUMMARY

This report describes the decline of sage grouse (*Centrocercus urophasianus*) in the Strawberry Valley of Utah, probable causes of the decline, results of a 4-year sage grouse radio tracking study, current population levels, and a sage grouse recovery plan.

Sage grouse numbers were estimated between 3,000 and 4,000 birds in 1939. Bird numbers were estimated between 250 and 350 in 1983. Current 1989 estimates placed bird numbers at 160 to 185 birds. This is a decline of 94 to 96 percent over the 1939 estimates.

The decline of sage grouse in the Strawberry Valley of Utah was due to a number of factors (converting shrublands to grasslands, increased human activities [camping, roads, summer homes], enlargement of the reservoir, rodent control through the use of poisoned grains). During the late 1950's and until the mid-1970's the valley was sprayed with herbicides to convert the big sagebrush lands to grasslands. Sage grouse have a near-obligate relationship with big sagebrush and its close relatives. These spraying projects destroyed thousands of acres of sage grouse habitat. Other factors have also added to the decline. Habitat has been lost due to flooding of the Stinking Springs strutting ground complex, construction of summer homes on Windy Ridge, and construction of campgrounds.

The spring, summer, fall, and winter range of the remnant population has been defined by a 4-year radio-tracking study. Only one active strutting ground was found in the valley. Surveys found no evidence of birds living in areas previously supporting sage grouse. These areas were Trout Creek, Chicken Creek (west and east), Co-op Creek, Strawberry River, and Mosquito Bay.

A recovery plan is presented. The plan consists of protecting and rejuvenating the big sagebrush resources, defining critical sage grouse habitat, setting aside areas as priority sage grouse habitat or areas to be rejuvenated, constructing watering holes, creating surrogate strutting grounds near Road Hollow, and transplanting birds to unoccupied habitat.

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INTRODUCTION

The decline of sage grouse (*Centrocercus urophasianus*) in the Strawberry Valley resulted mainly from managing the area for maximum productivity of a single range use, livestock production. History of Strawberry Valley showed sizable adverse effects from converting public rangelands from shrublands to grasslands. In our view increased livestock productivity did not justify this conversion.

In October 1989, the lands in question came under the administrative control of the U.S. Department of Agriculture, Forest Service, Uinta National Forest, Heber District. One of the goals of the new managers is to restore sage grouse habitat in the Strawberry Valley. This report serves as the foundation for the recovery plan. The report draws heavily on a study of sage grouse numbers and distribution conducted by the Intermountain Research Station and the Heber District from 1986 through 1989.

This report covers the biology of sage grouse, the impacts of past management of the Strawberry Valley on sage grouse, past and current range and numbers of birds, critical use areas, and recovery recommendations. The report proposes formation of a Strawberry Valley sage grouse recovery team.

BIOLOGY OF SAGE GROUSE

Sage grouse (spiny-tailed pheasant), often known locally as sage hen or chicken, are the largest of the native United States grouse. Mature males average about 6 pounds but can weigh as much as 7 pounds. Females weigh about half as much as the males. The sage grouse has been described as the chief ornament of the North American fauna (Patterson 1952). The annual mating dance of the males is spectacular. The sage grouse was discovered by Lewis and Clark above the head waters of the Missouri River, and on the plains of the Columbia River. The explorers named it the "cock of the plains" (Rasmussen and Griner 1938).

No other North American game bird is so inextricably dependent upon one plant species as sage grouse is on big sagebrush (*Artemisia tridentata*) and its near relatives (Roberson 1984). Rasmussen and Griner (1938) observed close agreement between the original range of sage grouse and the distribution of big sagebrush and its near relatives (also compare Beetle's [1960] distribution map of big sagebrush with Patterson's 1952 sage grouse range map). Patterson (1952) observed that the birds showed no signs of adjusting to the eradication of big sagebrush (also see Braun and others 1977). Sage grouse use sagebrush for food, escape, roosting, loafing, brooding, and nesting cover. They are seldom found far from these plants (Peterson 1970a). Sage grouse have a near-obligate relationship with big sagebrush and its close relatives of the subgenus *Tridentatae* of *Artemisia* (Roberson 1984).

The dependence of sage grouse on big sagebrush is illustrated by the food preferences of the bird. Sage grouse lack a muscular gizzard containing grit and thus cannot digest hard foods such as seeds. They depend on soft foods (Autenrieth 1986, Braun and others 1977; Patterson 1952). From October to April, big sagebrush leaves and short shoots make up from 90 to 100 percent of the diet of sage grouse (Braun and others 1977; Patterson 1952; Roberson 1984; Wallestad and others 1975). For 7 out of 12 months, or 58 percent of the year, sage grouse eat nearly pure diets of big sagebrush.

Even in spring and summer when other foods are available, adult sage grouse still consume large quantities of big sagebrush. Patterson (1952) reported that, in a Wyoming study, it was only during the summer that big sagebrush made up less than 80 percent of the diet of sage grouse. He found that big sagebrush comprised 87 percent of the spring diet and 45 percent of the summer diet of adult sage grouse. Rasmussen and Griner (1938) found that big sagebrush and silver sagebrush (*A. cana*) comprised 88 percent of the spring diet and 49 percent of summer diet of adult sage grouse in the Strawberry Valley of Utah. In Montana, Martin (1970) found that big sagebrush made up 34 percent of the summer diet of adult sage grouse. Also in Montana, Wallestad and others (1975) reported that big sagebrush comprised 84 percent of the spring diet and 8 percent of the summer diet of adult sage grouse.

In Idaho, Gates and Eng (1983) found that big sagebrush comprised 77 percent of the spring/summer diet of adult sage grouse. Leach and Hensley (1954) and Leach and Browning (1958) found that the late summer diet of California sage grouse was 42 percent big sagebrush. It appears that year-round use of big sagebrush by adult sage grouse reaches a low of about 43 percent during the summer, increases to 86 percent in the spring, and reaches a high of 92 percent for the fall/winter season.

The diet of young sage grouse differs from that of adults. Rasmussen and Griner (1938) studied the food habits of juvenile sage grouse in the Strawberry Valley of Utah. They found that big sagebrush and silver sagebrush made up 25 percent of the June diet, 22 percent of the July diet, and 36 percent of the August diet. After August, the diet of juvenile sage grouse was similar to that of adults. Insects and forbs were extremely important in the June, July, and August diets of juvenile sage grouse. Similar results were reported by Patterson (1952) in Wyoming, Klebenow and Gray (1968) in Idaho, and Peterson (1970b) in Montana.

The importance of sagebrush in the life history of sage grouse is further illustrated in the bird's preference for cover and the selection of nesting sites. Sage grouse hens nest almost exclusively under big sagebrush plants. Researchers found that 90 to 95 percent of the nests were placed under big sagebrush plants (Roberson 1984). Hens appear to select nesting sites beneath big sagebrush that has a good canopy cover and is relatively tall. Autenrieth (1981) observed that big sagebrush plants with an umbrella effect were usually selected by the hen. He attributed this selection to improved survival of the hen and improved nest success due to protective camouflaging. "The importance of big sagebrush cover for nesting cannot be overestimated" (Autenrieth 1981).

Most studies indicate that the majority of nests are located under the tallest plants available in an area (Roberson 1984). One study showed that hens preferred big sagebrush to black sagebrush for nesting (Roberson 1984). Autenrieth (1981), however, found that hens selected something less than the tallest and densest canopy cover. He believed that the height and density of sagebrush on his study area was greater than those in other studies. Apparently height and density of canopy cover were not limiting factors in the Autenrieth (1981) study. Average height of nesting plants ranged from about 16 to 31 inches. Canopy cover (percentage of the ground covered by big sagebrush) for nesting sites ranged from 20 to 40 percent (Roberson 1984).

The quantity and quality of big sagebrush is important even on the mating grounds. Characteristics of strutting grounds vary greatly. They may be bare openings in big sagebrush, gravel pits, plowed fields, wheat stubble, salt licks, remote air strips, temporary sheep camps, paved roads, bare exposed ridges, knolls, small buttes, and dry lake beds (Roberson 1984). Strutting grounds are not distinctive except that they are surrounded by big sagebrush cover. Sagebrush plants surrounding the strutting grounds are of critical importance. These plants are used as escape cover for females coming into the strutting ground. They provide food and loafing areas for the males. The height and canopy cover values for nesting sites are similar to the characteristics of loafing sites selected by males near strutting grounds.

In summary, sage grouse depend on big sagebrush and associated forbs and insects to fulfill their basic requirements. The future of sage grouse, in the Strawberry Valley and elsewhere, depends on our ability and willingness to maintain suitable sagebrush habitat types. Big and silver sagebrush populations are recovering throughout the entire valley. Some areas are more advanced than others but the sagebrush in general is coming back. The status of forbs needs to measured.

IMPACT OF PAST MANAGEMENT OF THE STRAWBERRY VALLEY ON SAGE GROUSE

The Strawberry Valley is a high (8,000-foot) mountain valley comprising some 175 to 188 square miles (see fig. 1 for boundary details). The valley is located in north-central Utah about 20 miles southeast of Heber City, UT. The valley is a mixture of public lands managed by the Heber Ranger District, private lands, and lands owned by the Uintah and Ouray Indian tribes. Strawberry Reservoir is the dominant feature of the valley.

In the early 1900's, several thousand acres of the Strawberry Valley were withdrawn from public lands by the Bureau of Reclamation. The Bureau constructed a dam that formed the Strawberry Reservoir. Lands not inundated by the reservoir came under the management of a private organization called the Strawberry Valley Water Users Association even though the public ownership continued. The association managed the lands of the reclamation withdrawal for cattle and sheep production.

Rasmussen and Griner (1938) estimated in 1936-37 that the valley supported 3,000 to 4,000 sage grouse. They also reported the establishment of a Federal refuge to aid sage grouse and migratory waterfowl. Sometime in the past the refuge was abolished. Smith and Greenwood (1983) reported that in the early 1980's the sage grouse population was 250 to 350 birds. This represents a 90 percent

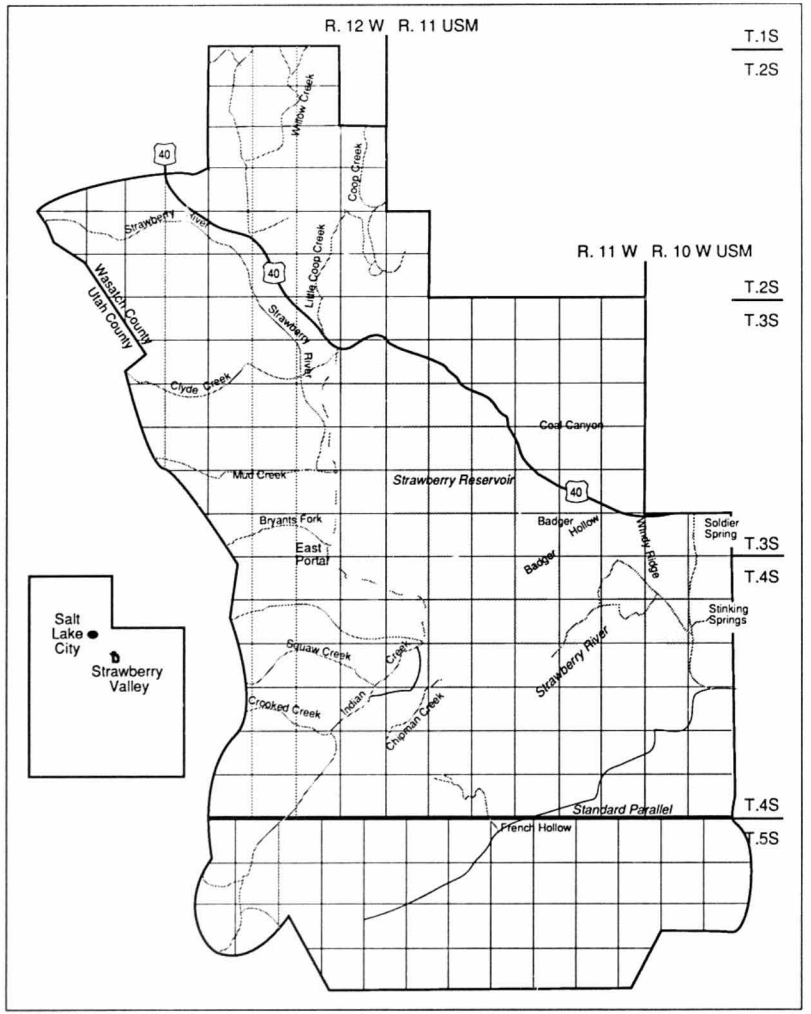

Figure 1—Location map, Strawberry Valley of north-central Utah (Uinta Special Meridian).

decline in population size since the 1930's. The decline was due to the eradication of big sagebrush and silver sagebrush to maximize grass production. The herbicides used destroyed not only the big and silver sagebrush needed by adult birds but also the forbs needed by chicks. The importance of forbs in the diet of chicks has been documented by a number of researchers (Braun and others 1977; Call 1979; Connelly and Ball 1983; Crawford and Lutz 1985; Grandison and Welch 1987; Klebenow 1970, 1982; Martin 1970; Patterson 1952; Peterson 1970a, 1970b; Roberson 1984; Swensow and others 1987; Wallestad and Pyrah 1974). Past management of the Strawberry Valley is a classic example of single-use management failing to consider and provide for other range uses. A visible example of rangeland deterioration in this valley is the near extermination of willow (*Salix* spp.). Willows are very important in stabilizing the riparian ecosystem. Griner (1939) estimated that the valley contained 770 acres of willow. Now there is less than 10 acres.

CURRENT RANGE OF SAGE GROUSE

Starting in April of 1986, we collected, by means of a rocket net, female sage grouse from the Road

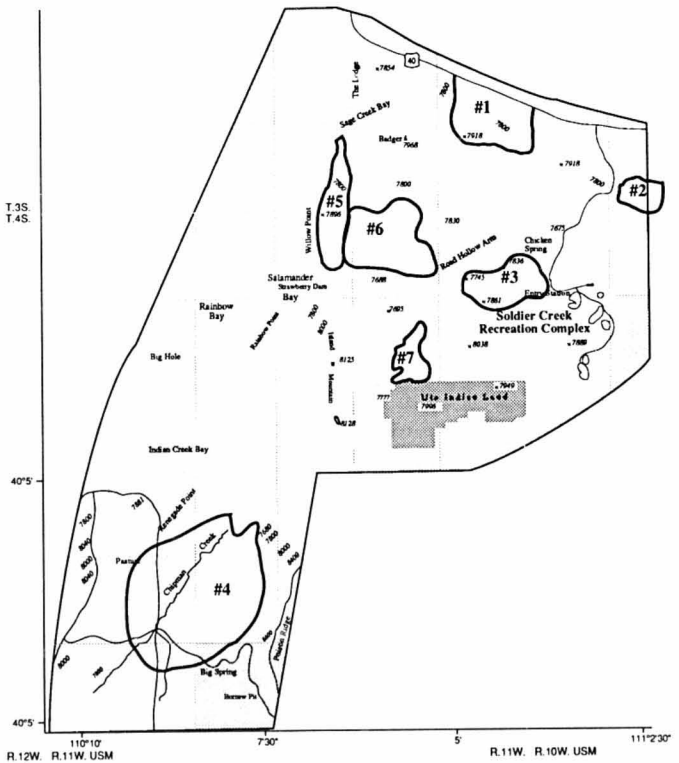

Figure 2—Spring/summer/fall range of sage grouse in the Strawberry Valley. Areas outlined in dark lines and numbered are heavy sage grouse use areas (Uinta Special Meridian).

Table 1—Spring/summer/fall movement of radio-marked sage grouse among the seven areas defined in figure 2. Numbers in columns under the various areas are individual radio-marked hens (except 933, which was a male). Hens returning from a previous year are designated by the letters RB (return of bird from last year). Reuse of an old radio is noted by the designation NH meaning (old radio, new hen)

Year	Areas							
	1	2	3	4	5	6	7	Outside[1]
1986	127	167	49	182			85	49
	250		370	328			208	85
								250
1987	49RB		167RB	835	328NH		85RB	12
			182NH		581		351	370NH
1988	813	835NH	167RB	912	864	892		1.012
	982		208NH			933		
	1.012		407					
1989	892RB		407RB	912RB	864RB		982RB	407RB
	1.012RB		813RB					

[1]Details of bird location given in the text for the year specified.

Hollow strutting grounds (fig. 2). We fitted captured hens with solar-powered radio transmitters attached to bibs. Only data from those hens that carried a functional transmitter into October were used (many went beyond this period). Table 1 shows the number of birds for each year of the study. Readers should note that for the years 1987, 1988, and 1989 some of the birds returned from the previous year with functioning transmitters. Contact was made once a month with the radio-marked hens on their spring, summer, and fall range. In August we noted the number and location of nonmarked hens flushed during our search for radio-marked hens. We attempted to locate the birds once a month on their winter range.

After the 1987 data-collecting season, we noted that on the spring, summer, and fall range a large majority of the birds were using seven areas for nesting and brood rearing. One of the seven areas was also a loafing area for the males. Areas are outlined in figure 2. Movements of hens and one male from the Road Hollow strutting grounds are summarized in table 1. Details not given in table 1 are given below.

Bird Movement—1986 Spring/ Summer/Fall

Radio frequencies (150.000 mhz) for the nine hens were 49, 85, 127, 167, 182, 208, 250, 328, and 370. (Hen 167 was captured in area 2 and fitted with a radio in October 1985). Hen 49 nested just east of area 3. After her five chicks hatched she moved them into area 3. There they stayed until they left for their winter range. Hen 85 was found east of area 7 during June and July and then spent the remainder of the summer and fall in area 7. The remaining hens spent the spring/summer/fall in the areas indicated in table 1.

During the August contact period, we noted the number and location of nonmarked hens and males we flushed during our search for radio-marked hens. We found 16 hens in area 1, 13 hens in area 2, three hens in area 3, five hens in area 4, five hens in area 5, 26 males in area 6, and five hens in area 7.

Bird Movement—1987 Spring/ Summer/Fall

Radio frequencies for the 10 hens were 12, 49 (return from 1986), 85 (return from 1986), 167 (return from 1986), 128 (old radio, new hen), 328 (old radio, new hen), 351, 370 (old radio, new hen), 581, and 835. All but two hens remained in one of the seven areas during the spring/summer/fall period. Bird 370 nested and raised her five chicks about one-half mile west of area 2. Bird 12 spent the spring/summer/fall period about three-fourths mile west of area 1. The remaining hens spent the spring/summer/fall in the areas indicated in table 1.

During the August contact period, we noted the number and location of nonmarked hens and males we flushed during our search for radio-marked hens. We flushed 17 hens in area 1, 10 hens in area 2, eight hens in area 3, five hens in area 4, six hens in area 5, two hens and 21 males in area 6, three hens in area 7, three hens between areas 1 and 6, and three hens between areas 2 and 3.

Bird Movement—1988 Spring/ Summer/Fall

Radio frequencies for the 10 hens and one male were 167 (return from 1986 and 1987), 208 (old radio, new hen), 407, 813, 835 (old radio, new hen), 864, 892, 912, 933 (male), 982, and 1.012. All hens were found in one of the seven areas except one (table 1). Hen 1.012 spent June and July in area 1 but moved between areas 1 and 6 for the remainder of the spring/summer/fall period. Unlike the other years, we noted movement from area to area for two hens. Hen 813 started in area 3 in June and moved to area 1 for the remainder of the spring/summer/fall period. Hen 892 moved from area 1 in August to area 6 for the reminder of the spring/summer/fall period.

During the August contact period, we noted the number and location of nonmarked hens and males that we flushed during our search for radio-marked hens and the male. We flushed eight hens in area 1, two hens in area 2, three hens in area 3, three hens in area 4, four hens in area 5, three hens and 18 males in area 6, three hens in area 7, and three hens between areas 2 and 3.

Bird Movement—1989 Spring/ Summer/Fall

Radio frequencies for the seven hens were 407, 813, 864, 892, 912, 982, and 1.012. All of these hens were return birds from 1988. All hens were found in one of the seven areas except one (table 1). Hen 407 was found between areas 2 and 3 in July. In the other months she was located in area 3.

During the August contact period, we noted the number and location of nonmarked hens we flushed during our search for radio-marked hens. We flushed 10 hens in area 1, no hens or males in area 2, three hens in area 3, seven hens in area 4, four hens in area 5, 10 hens and 19 males in area 6, and two hens in area 7.

Observations of Bird Movement on Spring/Summer/Fall Range

Pooling the radio-marked hens and the single male observations over the 4 years yields a ranking of the seven nesting and brooding areas (table 2). Twenty-four percent of the observations were in area 3; 19 percent in area 1; 14 percent in area 4;

Table 2—Seasonal distribution of marked and nonmarked sage grouse in areas defined in figure 2. Data are expressed as number of female birds found in the area. Nonmarked birds were also hens found in the areas during August of each year[1]

Item	Areas								
	1	2	3	4	5	6	7	Outside	Total
Marked birds									
1986	2	1	2	2	0	0	1	1	9
1987	1	0	2	1	2	0	2	2	10
1988	2	1	3	1	1	2	0	1	11
1989	2	0	2	1	1	0	1	0	7
Total	7	2	9	5	4	2	4	4	37
Percent	19	5	24	14	11	5	11	11	
Nonmarked birds									
1986	16	13	3	5	5	0	5	0	47
1987	17	10	8	5	6	2	3	6	57
1988	8	2	3	3	4	3	3	3	29
1989	10	0	3	7	4	10	2	0	36
Total	51	25	17	20	19	15	13	9	169
Percent	31	15	10	12	11	9	8	5	

[1]Male sage grouse were found during August only in area 6 (26 in 1986, 21 in 1987, 18 in 1988 and 19 in 1989).

11 percent each in areas 5, 7, and outside the seven areas; and 5 percent each in areas 2 and 6. Results of counts made for the nonmarked hens are also given in table 2.

Area 2 is of special interest. This area is located in a summer home development on Windy Ridge. Smith and Greenwood (1983) have described this area as the best brooding habitat in the Strawberry Valley. In the fall of 1985, it was common to see sage grouse along roads, around the summer homes, and in the big and silver sagebrush. After the spring of 1987, the number of birds sighted fell (table 2). This corresponds very closely with the movement of bird 167 out of area 1 to area 3 (1987 and 1988). Table 2 shows a dramatic drop in the number of nonmarked birds from 1986 to 1989. We not only searched the area during the normal time in August 1989 but also searched the area again in October 1989 (unlike other areas we conducted equal searches in area 2 for the 4 years). Both searches flushed no birds. This corresponds to flushing an average of 11 birds during 1986 and 1987. Talks with seven home owners supported our conclusions. They reported seeing substantially fewer birds during the last 2 years. We believe that the birds are abandoning this area, probably because of increased home building, increased human activities, increased removal of big and silver sagebrush plants, and perhaps drought.

Winter Range

Usually most sage grouse in the Strawberry Valley leave for their winter range around mid-November. The timing of this annual movement appeared to be independent of the depth of snow. Movement out of the Valley is eastward, with a slight increase in elevation.

We have located eight wintering areas. These areas are delineated in figure 3. Perimeters of areas circumscribed all sites where marked and nonmarked birds, droppings, tracks, and feathers

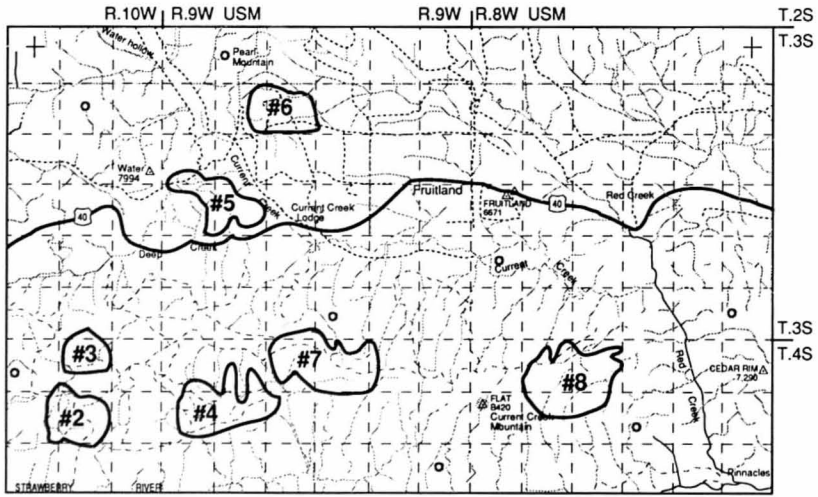

Figure 3—Winter range of sage grouse of the Strawberry Valley. Numbered areas outlined in dark lines and numbered are heavy sage grouse use areas (Uinta Special Meridian).

were found. The birds were distributed over a large area. They did not express the same fidelity for winter range that they did for their spring/summer/fall range. Most of the winter range is under private ownership, except area 6, which is under the ownership of the Bandanna Ranch (a sport group) and the Utah Division of Wildlife Resources.

Area 1 is found in the Chipman Creek areas next to area 4 of the spring/summer/fall range (fig. 2). This is the only known wintering area in the Strawberry Valley. We found hen 328 wintering (1986-87) in this area with 15 other hens. These birds remained in the area until breeding time in early April. In 1988-89, hen 1.012 was found wintering in this area with six other hens. The hens left the area for area 7 in late February when deep snow completely covered all the big sagebrush plants.

Area 2 is located at the head of Pine Hollow (fig. 3). Hen 250 wintered here with 23 other birds (1985-86). We found 29 nonmarked birds wintering here in 1986-87, and 12 nonmarked birds in 1988-89 until snow depth covered the big sagebrush plants in late February.

Area 3 is located just north of area 2 (fig. 3). We found seven nonmarked birds wintering in this area in 1985-86. No birds where found in this area for the next three winters.

Area 4 is located about 1½ miles east of area 2 or just east of the head of Bear Hollow. Hen 289 was found in this area in 1986-87. This was a radio-marked hen we did not locate on the spring/summer/fall range but found on the winter range. Seven nonmarked birds also wintered here during this winter. In the winter of 1988-89, another hen, 813, was located in this area with 17 nonmarked birds.

Area 5 is located about 3 miles north of area 4 across U.S. Highway 40 just west of U.S. Highway 40 junction with the Current Creek Road. Hen 85 was found wintering in this area (1986-87) with 17 nonmarked birds. We found five nonmarked birds in this area during the winter of 1988-89.

Area 6 is located about 2¾ miles north of the Current Creek Store (fig. 3). Two hens, 49 and 127, were found wintering in this area during the winter of 1986-87 with 35 nonmarked birds. We did not find any birds wintering in this area during the winter of 1988-89. This was surprising in light of the large numbers of birds there during the winter of 1986-87. This observation supports our belief that wintering birds may not express the degree of fidelity for winter range that they do for spring/summer/fall range.

Area 7 is located about 2 miles south of the Current Creek Store (fig. 3). During the 1988-89 winter, we found three hens—892, 912, and for February and March, 1.012. We further found 86 nonmarked birds wintering in this area. We found no birds in this area during the winters of 1985-86, 1986-87, and 1987-88. Again, apparently birds do not have the strong preference for winter range that they do for spring/summer/fall range.

Winter range does not appear to be a limiting factor in the production of sage grouse in the Strawberry Valley Area. This opinion is based on two supporting observations: first, the birds seem to disperse over a vast area and lack the fidelity for a particular area; second, the wintering areas support adequate stands of big sagebrush. The wintering areas are dissected by deep drainages; therefore, herbicidal removal of big sagebrush would not be economically feasible.

NUMBERS OF BIRDS

The hardest part of this study was determining just how many birds are in the Strawberry Valley. Based on strutting ground counts we place the total population at 160 to 185 birds. This value is based on peak male counts on the Road Hollow strutting ground in 1988 and 1989. Peak count for 1988 was 30 and for 1989, 26. The peak male count is multiplied by 2 (the ratio between females and males), the number of females is then multiplied by 40 percent (nest success), and the result multiplied by the average number of brood size (3.98) (Smith and Greenwood 1983). These values are down from the estimates of 250 to 350 birds reported by Smith and Greenwood (1983), which were down drastically from the estimates of Rasmussen and Griner (1938) (3,000 to 4,000 birds). Since the Smith and Greenwood (1983) estimates of bird numbers, the Stinking Springs strutting grounds with its associated nesting and brooding areas has been lost to reservoir enlargement. This probably accounts for the drop in numbers of birds from Smith and Greenwood's (1983) estimate to ours.

PAST RANGE OF SAGE GROUSE

Smith and Greenwood (1983) reported the existence of five strutting grounds in the Strawberry Valley. These strutting grounds were located at Stinking Springs (Green Knoll), Trout Creek, Trail Hollow, Co-op Creek, and Road Hollow. We searched these areas in late April 1989 and found no active strutting grounds except in the Road Hollow area. Stinking Springs (Green Knoll) strutting ground has been flooded by the new Strawberry Reservoir. This means that sage grouse have suffered an 80 percent reduction in number of strutting grounds in Strawberry Valley. This may explain why we found only a fraction of the number of birds reported by Rasmussen and Griner (1938).

In addition to searching for strutting grounds, we also searched other areas of the valley for possible sightings and signs of sage grouse. During July of 1989, we searched the following areas for sage grouse and signs of sage grouse: the area south of U.S. Highway 40 below Trout Creek (15 miles of transect), the area north of U.S. Highway 40 at Trout Creek (14 miles of transect), the area north of U.S. Highway 40 at Chicken and Co-op Creeks (36 miles of transect), the Strawberry River starting at the visitor center and ending at U.S. Highway 40 (54 miles of transect), and the area south of U.S. Highway 40 starting at the Strawberry River and ending on the east side of Jake's Bay (8 miles of transect). Our search was conducted on horseback and on small all-terrain vehicles. We covered about 127 miles in the search areas. Our search of 127 miles did not locate any birds or signs of birds. Birds are absent from former locations. The apparent cause of the decline was habitat destruction caused by large spraying operations to eradicate sagebrush. Other activities such as building of roads, campgrounds, and summer homes, reservoir enlargement, and associated increases in human traffic certainly contributed to the decline of sage grouse in the Strawberry Valley. To sum up, the few remaining birds of a once large and widespread population survive only at the Road Hollow strutting ground and its associated nesting, brooding, and loafing sites. This area was described by Smith and Greenwood (1983) as critical sage grouse habitat.

RECOMMENDATIONS

We offer the following recommendations as a start in developing and implementing a recovery plan:

1. Careful consideration of sage grouse needs before conducting sagebrush control projects.
2. Adherence to the "Guidelines for Maintenance of Sage Grouse Habitats" (Braun and others 1977).
3. Including in the forest plan provisions for the management of critical sage grouse habitat encompassing the following sections; 26, 25, 34, 35, 36 of range 11 west (Uinta Special Meridian), township 3 south; 1, 2, 3, 9, 10, 11, 12 of range 11 west (Uinta Special Meridian), township 4 south; and 20, 21, 28, 29, 30, 31, 32, 33 of range 11 west (Uinta Special Meridian), township 4 south.
4. Construction of water developments for sage grouse use on section 12 of range 11 west (Uinta Special Meridian), township 4 south.
5. Creating three alternative strutting grounds in section 2 of range 11 west (Uinta Special Meridian), township 4 south. (The present strutting grounds will be flooded when the enlarged reservoir is filled.)
6. Rejuvenating the forb and sagebrush component, wet meadows, springs, and seeps of the Trout Creek area. When the habitat is suitable, cooperate with the Utah Division of Wildlife Resources in the creation of a strutting ground and in transplanting of sage grouse to the area. Identify in plans and maps the Trout Creek area as priority sage grouse habitat. This area includes the following sections: 3, 4, 8, 10, 15, 16 of range 11 west (Uinta Special Meridian), township 3 south.
7. Rejuvenating the forb and sagebrush components, wet meadows, springs, and seeps of the Chicken and Co-op Creek area. When the habitat is suitable, cooperate with the Utah Division of Wildlife Resources in the creation of a strutting ground and the transplanting of sage grouse to the area. Identify in plans and maps part of the Chicken and Co-op Creek area as priority sage grouse habitat. This area includes the following sections: 5, 6, 7, 8 of range 11 west, township 3 south; 29, 30, 31, 32 range 11 west, township 2 south.
8. Supporting research to determine the effects of grazing cattle and sheep on nesting sage grouse and broods. We believe that the actual grazing of cattle in sage grouse habitat, after nesting, probably has little effect on sage grouse. It is the destruction of sagebrush stands and forbs to increase grass production that has the most harmful effects on sage grouse. Sheep that tend to graze in more dense groups, may have a more negative effect on sage grouse. Research is needed to measure these effects.
9. Forming a Strawberry Valley sage grouse recovery team to formulate goals and implement plans for habit improvement and increasing sage grouse populations. The goal of the recovery team would be to increase the number of birds to 1,000 by the year 2000. Membership of the team should include at least one representative each from the Heber Ranger District, Utah Division of Wildlife Resources (CRO), Intermountain Research Station, private nonprofit conservation organizations, and other interested parties. The charge of the team would be to develop a plan to implement the recommendations of this report, to obtain support and resources to conduct and supervise the habitat improvement projects, to transplant sage grouse into the Trout Creek, Chicken, and Co-op Creek areas, to monitor the success of the transplanting program, and to conduct research on the interactions of sage grouse and livestock grazing. The team would also develop guidelines concerning the management of critical and priority sage grouse habitat.

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Since 1939, an estimated 3,000 sage grouse in Strawberry Valley, UT, have declined to some 180 birds, mainly because of reservoir construction and eradication of big sagebrush to promote livestock forage. A 4-year study of numbers and movements of radio-tagged grouse has provided the basis for a recovery program calling for rejuvenation of big sagebrush and forbs important to grouse, replacement of mating grounds lost to human activities, consideration of sage grouse biology in management decisions, and formation of a sage grouse recovery team.

KEYWORDS: wildlife management, radio tagging, sage grouse management, sagebrush rejuvenation

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